Addendum A

Governor's Task Force on K-12 Science, Technology, Engineering and Math (STEM) Education

DRAFT Minutes March 23, 2016

Location: NHTI Student Center 10-noon

I. Call to order and introduction by Chair Ross Gittell

II. Approval of September 29, 2015 meeting minutes (Refer to Governor's website on STEM Task Force activities for copy of the approved minutes)

III. Briefings:

a. Tanna Clews: STEM work though NHCF and NGA (with Brittany Weaver)

In 2014, the New Hampshire Charitable Foundation released a research report on the NH STEM employment pipeline and concluded that too few NH students would be qualified to fill the great number of STEM middle to upper level positions available in the next five years. The NHCF issued seven recommendations, among them, the need to focus on developing student potential in Career and Technical Education. The NHCF is currently working with the CTE center at Keene to rethink and modernize CTE education to focus on offering computer science and information technology concentrations. These studies will prepare students not only for well-paying jobs in IT and CS fields, but also in other rapidly growing fields such as Advanced Manufacturing and Healthcare which also require a knowledge of IT and CS.

The NHCF has built a career pathway in computer science that aligns to requirements of the Community College System and University of New Hampshire, Manchester.

National Governor's Association and Work-Based Learning Grant: The State has obtained a planning grant to scale a statewide Work-based Learning (WBL) system for 16-29 year olds. The grant is focused on building areas of excellence in Career and Technical Education, Community College System and apprenticeships. The goal is to expand opportunities so every NH aged 16 to 29 will have a WBL opportunity by 2020. The project will engage NH stakeholders to envision WBL statewide and integration of competency-based education work (academic credits for WBL experience).

b. Scott Powers: NH College & University Council –NH STEM Scholars program

In the fall of 2015, the New Hampshire College & University Council launched NH STEM Scholars. Students can now choose one of three options to pursue a NH Scholars diploma: the traditional NH Scholars path, a newly created STEM emphasis, and a brand new ARTS emphasis. The new options will require a minimum grade point average (GPA) as well as classes focused on each specific path. These rigorous programs created by NH Scholars will be an incentive program for any student in New Hampshire to realize their dreams of a college education and rewarding career. Based on changes and challenges of the

state's economy, along with a focus on STEM-related careers, these pathways add both content and intensity. The business community needs graduates who are skilled in STEM programs. The NH Scholars STEM emphasis will require four years of English, math and science, with an additional year of a STEM-related course. To receive this recognition, students must carry a 3.2 GPA while also taking social science and foreign language classes. The current NH Scholars program will remain. It will continue to require students to take four years of English and math, with three years of lab-science, 3.5 years of social science and two years of a foreign language to qualify for NH Scholars recognition. There is no GPA minimum requirement for the traditional NH Scholars pathway. For more information see: http://www.nhscholars.org/course-of-study/

c. Ross Gittell: Update on MIT/TF/STEAM AHEAD partnership on coding across curriculum for K-12 teachers
The MIT Teacher Education Program, Education Arcade, met with STEM Task Force, STEAM AHEAD and K-12 school representatives to discuss a pilot with selected New Hampshire schools to educate teachers about coding across the curriculum, utilizing MIT develop app tools. MIT submitted a training proposal which included: a summer 2-day training session with up to 75 NH teachers, followed by another session in the fall and year-long professional development support. The objective is to equip NH K-12 teachers (with an initial focus on Manchester West) to teach coding through apps integrated throughout the curriculum. Representatives from STEAM AHEAD are preparing a master proposal including costs and funding.

d. Career Day statewide: discussion and feedback –ideation. Barbara Couch, leading the Personal Learning Plan (PLP) Initiative, with the help of Annie Wallace, will incorporate Career Days into the PLP plan.

IV. Discussion/Feedback: Feasibility study of TF group – NH Math and Science Academy. See Addendum B.

The Task Force concurred that the NH Math and Science Academy out to be open access, rather than limited to students with only the highest grades in STEM high school studies. April 25, the Task Force NHMSA working group, hosted by Southern New Hampshire University, will host a Design Day to concept the framework for an academy. Experts from NH and nationally have been invited to participate.

V. Task Force working group submitted written reports of actions to fulfill goals and prepare for Annual Report to Governor, June 2016. See Addendum C

VI. Other business:

a. Next meeting May 4th 10-noon (location to be determined). Ross Gittell and Martha Parker will meet to determine strategy and timetable for Annual Report to the Governor, June 2016 and will report out at the May 4th meeting.

ADDENDUM B:

ADDENDUM B: MARCH 23 BRIEFING DOCUMENT FOR STEM TF FOR NHMSA DISCUSSION[1]

Problem that the NHMSA working group is trying to solve: The pipeline of NH high school students on track to enter STEM bachelor degree programs is insufficient to support current and future growth of NH STEM industry.

Data[2] supporting the problem that the NHMSA Working Group is trying to solve:

- More than half of STEM job openings are in occupations requiring at least a bachelor's degree.
- While New Hampshire consistently ranks among the top 10 states in the percentage of bachelors' degrees, the state ranks 32nd in the percentage of bachelor's degree graduates in STEM.
- New Hampshire ranks 49th in the percentage of STEM credentials awarded per STEM employee.

Nonnegotiables for NHMSA:

- NHMSA, regardless of the form it takes, must prepare high school students for success in earning a STEM bachelor's degree or higher.
- NHMSA, regardless of the form it takes, should serve students from throughout NH.

Background of NH STEM Task Force Working Groups:

- The NH Math & Science Academy (NHMSA) Working Group is responsible for determining the feasibility of creating this free, public, STEM-intensive college preparatory high school (or network of high schools) for NH residents.
- Another Task Force working group is addressing the need for new or enhanced certificate programs at Career and Technical Education schools that may lead to the community college system. So the NHMSA working group need not address the STEM pipeline to STEM certificate or associate degrees.
- Another Task Force working group is addressing the need for increased participation in STEM challenges, competitions, and capstones, so the NHMSA working group need not address that.

Assumption for the April 25th NHMSA Design Day: Increasing the pipeline of NH students on track to earn STEM bachelor's degrees should be a joint effort between the NH Department of Education, NH public secondary schools, NH's public and private colleges and universities, and NH STEM industry partners.

[1] Feedback after March 9th Meeting from NHMSA Working Group (Susan, Tom, & Martha) to Sandbox Team (Michelle & Patrick)

[2] Source of Data: "Pathways to STEM Excellence: Inspiring Student, Empowering Teachers, and Raising Standards" report submitted to Governor Hassan in January 2015 by the NH STEM Task Force. See http://governor.nh.gov/commissions-task-forces/stem/documents/stem-01-2015-k-12.pdf

No assumptions for the April 25th NHMSA Design Day: No assumptions have been made concerning what this school should look like.

Guiding Questions for TF discussion March 23

1. Does anyone want to offer a compelling argument for a potential "nonnegotiable" for the composition of NHMSA's student body? That is, is there a compelling reason to emphasize one demographic in terms of academic, economic, or other distinguishing features? If so, what are the potential benefits and challenges of this selection? Please note that we are interested in keeping the number of non-negotiables to a minimum. However, if there is a compelling reason to add an additional nonnegotiable, then we need to articulate that now.

2. What is on your mind about NHMSA that you believe has not been addressed? Note that much the work lies ahead of us. However, if you have a question or concern about the path we are charting, please bring it up

ADDENDUM C: TASK FORCE WORKING GROUP REPORTS

1. Foundations of STEM working group:

Goals

The Foundations in STEM Working Group has the following goals:

Alternative Math Pathways: recommend appropriate courses for non-calculus tracks, specifically (a) data/statistical analysis and (b) linear algebra, at the high school level

Coding: identify high-level content for a high school coding / computer science course that would be suitable for meeting the math requirement

Teacher Preparation: identify possible process(es) by which teachers can develop any additional background or credentials needed to teach coding in high school

Additional: address opportunities to teach coding across the curriculum, including at the high school level, and develop examples of coding concepts that could be taught in pre-K through 8.

Progress

Three brief documents have been developed, one outlining initial recommendations for content of a coding course to confer mathematics credit, the second outlining the three proposed four course high school math pathways, and the third outlining efforts towards micro-credentialing in other states and the current opportunity to develop an updated credentialing framework for NH. For the math pathways

document, the initial outline proposes that each mathematics pathway culminate in a dedicated course in the relevant area, e.g. Calculus, Probability and Statistics, or Linear Algebra.

Key questions that the Working Group will be addressing in the next period:

- Narrowing the recommended content for the computer science course, trying to achieve the appropriate balance between providing guidance and schools-specific flexibility

- Commenting on the suitability of the AP Computer Science course to achieve Task Force recommendations for coding content

- Assessing the feasibility of including a course on coding in the mathematics pathways the Working Group is recommending. At present, a course on coding, even if it allowable for mathematics credit would be a 5th course in high school mathematics, and thus may become an opportunity that is generally explored only by the most advanced students.

- Developing clearer understanding of what certification or credentialing is needed for a teacher to teach coding as math, and identifying that process

- Exploring (with individuals from other Working Groups) potential partnership with MIT to develop and offer a pilot workshop on teaching coding across the curriculum (ie in the specific discipline of the teacher)

- Working with the Department of Education to determine what action is needed for endorsement of the Alternative Math Pathways and for Coding as Math.

- <u>Next Working Group Conference Call:</u> Thursday March 24, 2016. Reported by Joe Helble

<u>2. Empowering Teachers working group:</u>

At the last meeting of the TF, Empowering Teachers reported their work on micro-credentialing would be put on hold until the NHDoE finished its work (with the CCSSO) on modernizing pre-service and in-service credentialing, including review of micro-credentialing. The group then turned their attention to their second goal: coordination of disparate professional development training being offered by various organizations throughout NH. The group focused on LESCN centers (NH Education Service Centers).

- The working group organized a call Feb. 17 with 3 of the 6 LESCN directors inviting them to present and discuss their programs for STEM professional development for K-12 teachers in NH. SERSEC, North Country and Southwest Center (now located at Keene State) attended. The Group is scheduling a second call with the remaining three directors this week. The goal and next steps: lead a collaborative effort among these professional development centers so that work can be better coordinated statewide, identify gaps and overlaps, and foster a community of interest

among these centers as delivery models of STEM professional education on a regional basis. Lead development of new approaches to delivery of professional development.

- Next working group: Arranging for week of March 29-April 1. Reported by Todd LaMarque

History List of centers:
https://docs.google.com/document/d/1f6cCJLCo1vY9t_kJwemt9_ytpcgCEZi3XQMFRZungow/edit

3. Inspiring Students working groups:

- **NH Math and Science Academy team:**
  - *After a number of interviews with founders and leaders in the math and science academies community as well as NH higher education leaders interested in working to support NHMSA , the NHMSA group met with SNHU innovations lab director (now known as the Sandbox) The attached notes provide more detail.*
  - ***Next steps**: With SNHU as a sponsor, the NHMSA group will recruit and hold a one-day design charrette April 25to sketch out a framework for the Academy and a timetable for further development of a proposal. Task Force members are asked to recommend participants from industry, especially those who seek employees with a college degree or higher as NHMSA is intended to be a college preparatory high school. Any Task Force Member who is interested in attending the April 25th Design Day and who has not already expressed an interest should let Susan know THIS WEEK. A list of invited participants will be available shortly and sent to the Task Force via email.* Reported by Susan D'Agostino.

- **Personal Learning Plans Update**
  - Spoke with Dan Auger in Senator Ayotte's office about the Middle STEP Act and how it aligned with our Pathways work. We agreed to work together in an attempt to garner stronger support for this Act while further defining the Act to align with our work. Perkins grant funding is being sought for Middle STEP. We agreed to work together to further define the Middle STEP Act. A summary of the Act is included on page two.
  - The Pathways Committee will be reviewing two Personal Learning platforms, LiFT and Naviance. LiFT is new to the market and currently in beta testing. Naviance has been around for a while and is the system of choice in the state of VT. We will have a live demonstration of the LiFT system on March 30. A date for exploring Naviance is currently underway.
  - Several members of the Pathways Committee (Jacqui Gillette, Joanne Roberts and Barbara Couch) are meeting on April 6 to discuss a Pathways pilot opportunity at the Lebanon Middle/High Schools.
  - Interviewed two superintendents asking the question, "What would success look like if we could create the perfect pathway opportunities for students both in middle school and high school?" This list is evolving and being circulated for further commentary. (Feb. 29)

  Middle School:

- Technology (personal learning plans) to aid in discerning students' interests, skills and talents; to bring greater coherence, focus, and purpose to the decisions students make around their short and long term educational goals. (Examples include Naviance and LiFT).
- Student advisors (in addition to guidance counselors) to work with students, teachers, parents, guidance counselors and the community at large for the purpose of helping students with their educational and career opportunities road map.
- Career Fairs annually
- Job shadow days annually
- Opportunities for career exposure and learning: Tours and time spent in workplaces (Little League of Manufacturing Program as an example)
- Mentors for students (aligned to academic/career road maps)

<u>High School:</u>

- Continuation of the Personal Learning Plan
- Competency based learning opportunities both in and out of the classroom aligned with Common Core and NGS Standards including Extended Learning Opportunities, apprenticeships, etc.
- Required financial literacy class
- Opportunities to graduate from high school with the credentials and certificates needed in the market place (dual enrollment opportunities during the school day, after school, summers and on-line).
- Half year internship during the senior year of high school
- Mentors aligned with career interests Reported by Barbara Couch

ADDITIONAL INFORMATION PRESENTED AT MARCH 23, 2016 MEETING: The key to Personal Learning Plans is getting started in middle school (and earlier) and drawing from the strong forces already working in the schools. Our end game is to have all middle school students better prepared to choose classes and opportunities they are offered in high school by offering them stimulating and engaging career and college opportunities that are appropriate for the middle level students. To do this we need to develop a mind set in students, parents, teachers, and communities - that middle school is NOT too early to be intentional about building career (and college) awareness and ultimately pathways to those careers and to college.

Ideas include:

1. Use the new Next Generation Science Standards and the Common Core Standards. The higher level, more STEM focused curriculum is right there.
2. Use the coming and current opportunities in both VT (PLPs) and NH (competency-based education) to catalyze the change in thinking which these initiatives require.
3. Work with ELO Coordinators, guidance, STEM educators, parents, business communities to jointly own the opportunity to prepare students for careers and education beyond high school.
4. Consider Student Advisors in the middle school to support and guide students through their Personal Learning Plans.
5. Develop/source units of study to be used within the school day at the middle level - Gateway (the PLTW middle school program), the grade 7/8 unit on the LLM cd, and the grade 6 unit on the LLM cd - are all examples - with a strong focus on STEM and the career fields available.

6. Look at existing partnerships throughout the state (Upper Valley, Rochester, Dover, and Somersworth, for example) where they are bringing middle school students into the workplace for tours, career exploration and job shadowing.
7. Develop afterschool program offerings that can be replicated at any middle or elementary school - using community and business partners as the "teachers."
8. Create regional Career Fairs for the middle school and high school students.
9. Develop ELOs for middle and upper elementary schools.
10. Review online opportunities like "virtual job shadow" and deploy as appropriate.
11. Consider Fred Bramante's MentorConnect.org as a model to connect not only high school, but eventually upper elementary school and middle school students with mentors who will then connect them with the world of careers.
12. Develop Project-Based Learning units (NEBHE) for middle school and upper elementary school students. These units online give more students access to this high quality learning unit. Example Hypertherm.
13. Assure that all students have access to high quality teaching and intervention so as to finish middle school having achieved reading and math at the appropriate levels.
14. Offer middle school students vacation/summer camps at businesses and colleges. UNH has a summer camp program for middle school students. Replicate in other parts of the state and find solutions to the transportation issues.
15. Use the online tools like Naviance and LIFT to engage students and their parents in this thinking and planning early in their educational journeys (at least early middle school).
16. Allow the use of Reflection for capturing and cataloguing the thoughts, passions and goals of students as they move through their Personal Learning Plans.
17. UN-silo all the great initiatives and work that people are doing throughout the state (UVBEP, 65x25, ED-squared, competency-based education, CTE Center reimagining, 1000 Mentors, MakerSpaces, FIRST Robotics/VEX Robotics, Little League of Manufacturing, etc.).CONNECT these people and their work.
18. Ensure that students in every region in the state have access to these kinds of educational opportunities within the context of the careers and further education that are available in that region.
19. Once there exists proof of concept, work to review the current middle school approval standards to ensure that policy supports and encourages (mandates) these types of learning experiences for all middle school students.

- **CTEs – Early College and modernization of CTE curriculum team update**

  New Skill for Youth Grant from CCSSO was submitted earlier this month and we expect to learn results by early April. The purpose of the grant is to create a Career Pathway System. The New Skills for Youth initiative, specifically Phase I of this grant, would provide us with the resources, technical expertise and short timeline needed to create such a plan. The plan identified four steps in the education/workforce pipeline to make this happen: competency based education, career technical education, work-based learning opportunities and pathways to careers that begin in middle or high school. Beyond the overarching goal of increasing post-secondary degrees and credentials, the grant, if received, will focus on increasing the number of young adults entering high demand STEM fields. More information is available at: *http://www.ccsso.org/Resources/Programs/Career_Readiness_Initiative.html*.
  Reported by Chris Dodge

- **Challenges, Competitions and Capstones team:**

- The focus on this group is to develop opportunities to expand the FIRST® competitions held in many schools throughout NH. A meeting will be scheduled with FIRST representative Don Bossi, Bob Hallowell., Chancellor Gittell, Brittany Weaver and others.
- Reported by Bob Hallowell

- **Girls in STEM team:**

With the help of Jeremy Hitchcock, FIRST, among others, we are gathering best-practices on engaging diverse learners across STEM pathways reviewing best practices that span formal and informal learning, P-12, higher education and industry. We have an informal subgroup willing to continue the conversation and work beyond April. Within Dartmouth, the office of outreach is continuing to centralize STEM education efforts, building potential sustainability in keeping the GTF efforts moving forward.

We will be partnering directly with the National Alliance for Partnerships and Equity and their stem equity pipeline. They have been pioneers in gender equity for years. They have lots of great relationships with historically black colleges and minority serving institutions. Reported by Lauren Provost

4. Communications and Engagement working group update:

The working group, led by Buck Beaudoin, is developing a user experience group (with parent/child/teacher) teams from different socio-economic backgrounds and geographic areas to test out website pilot (based on original design/wireframe presented to Task Force). Goal is to test out design by late April and after reviewing and validating recorded results, to report back to Task Force for review and approval to move forward.